

REMARKS/ARGUMENTS

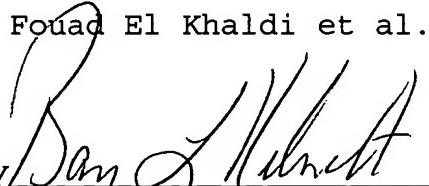
By the present amendment, a substitute specification is being filed in order to conform with U.S. practice. Headings and drawing descriptions have been added to the specification. The substitute specification contains no new matter. Further, claims 1-3 have been canceled in favor of new claims 4-6. The new claims are substantially substantively identical to claims 1-3 however they are in a better form for U.S. examination. The above amendments to the claims are not made for any reason of patentability. Still further, an Abstract has been added.

An early action on the merits is respectfully requested.

If any additional fees are required in connection with this case, it is respectfully requested that they be charged to Deposit Account No. 02-0184.

Respectfully submitted,

Fouad El Khaldi et al.

By   
Barry L. Kelmachter  
BACHMAN & LAPOINTE, P.C.  
Reg. No. 29,999  
Attorney for Applicants

Telephone: (203) 777-6628 ext. 112  
Telefax: (203) 865-0297  
Email: docket@bachlap.com

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I, Nicole Motzer, hereby certify that this correspondence is being deposited with the United States Postal Service as Express Mail in an envelope addressed to: "Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313" on October 11, 2005.



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**ANNOTATED SHEET SHOWING CHANGES**

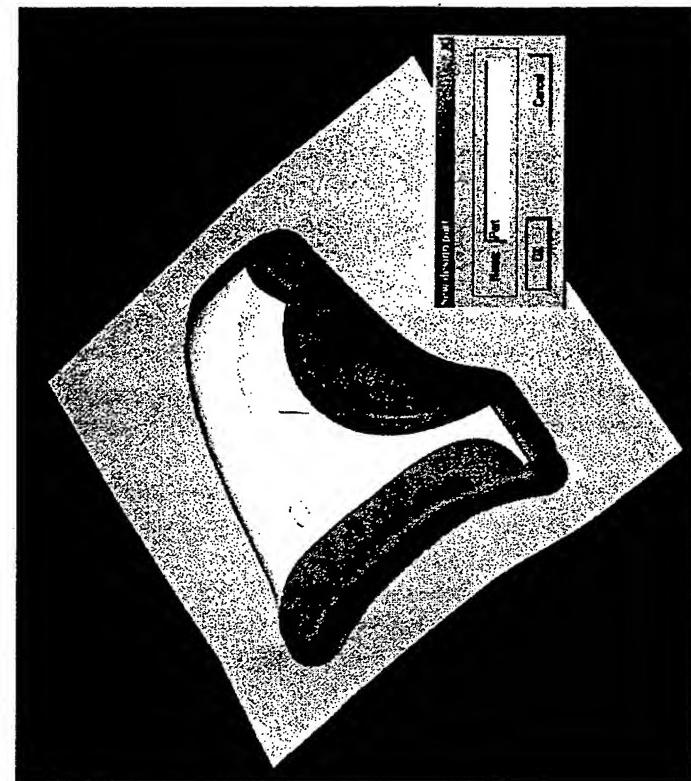
Title: PARAMETRIC REVERSE ENGINEERING METHOD FOR DESIGNING TOOLS

Inventors: Fouad El Khaldi et al.

Docket No.: 05-681

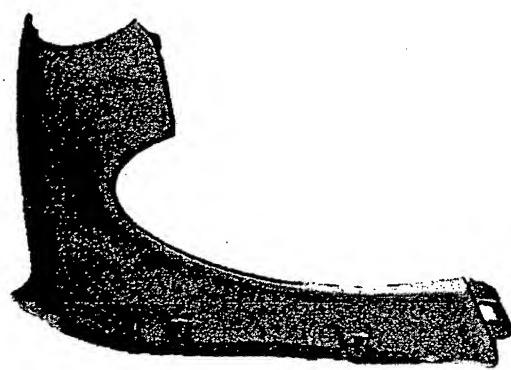
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**Existing tool for the  
existing part**

**Figure 3A**



**New part**

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Figure 4-

Figure 4A

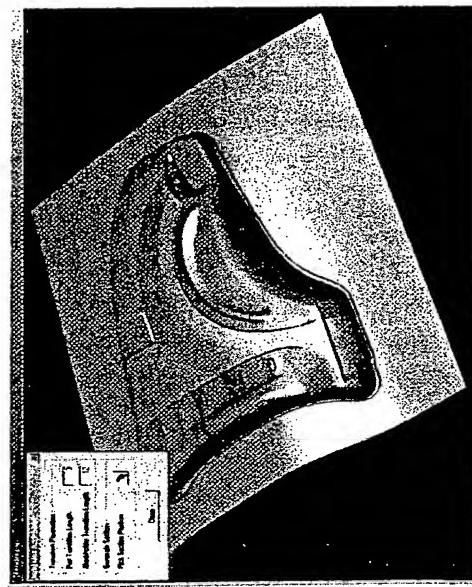
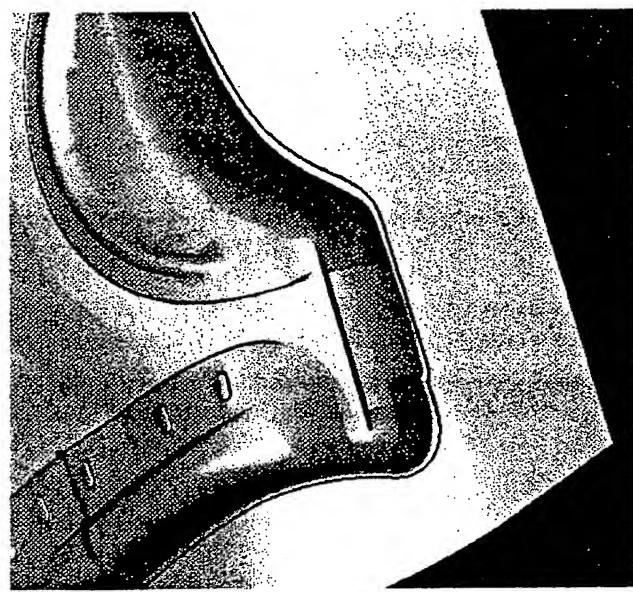


Figure 4B



—Breakdown-of-the-existing-tool-die-entry-line—

**ANNOTATED SHEET SHOWING CHANGES**

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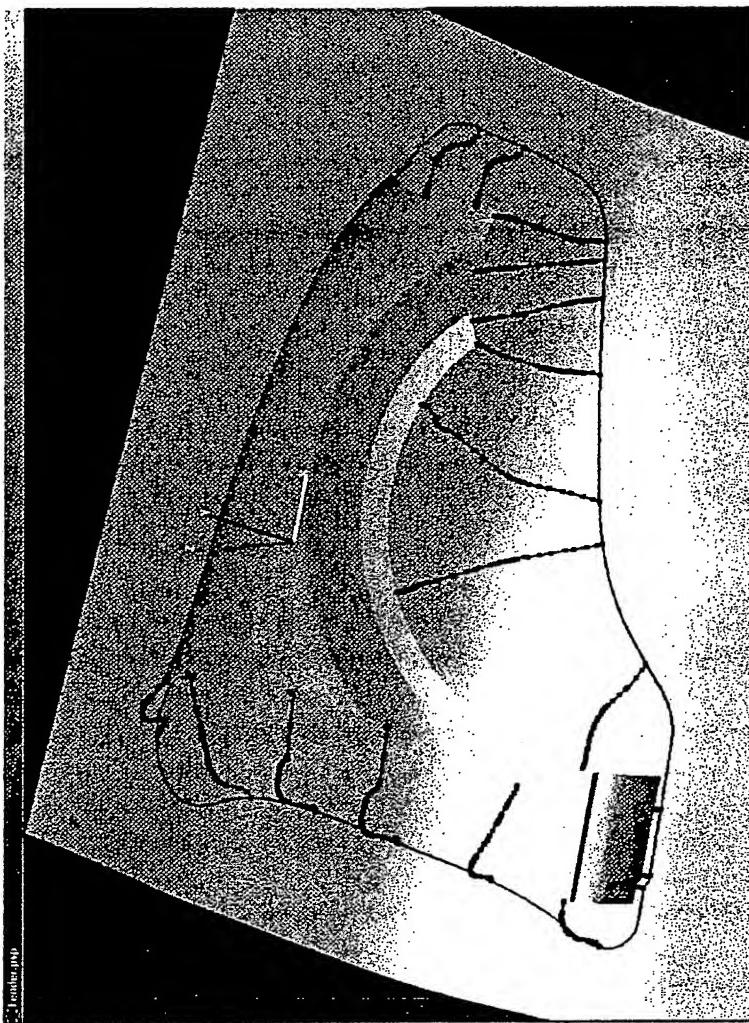
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Figure 5



**-Breakdown-of-the-existing-tooth:-reconstruction-of-profile-**

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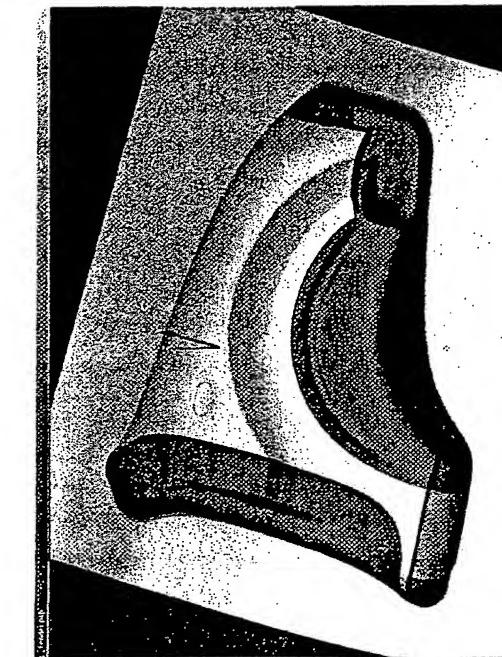
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Figure 6

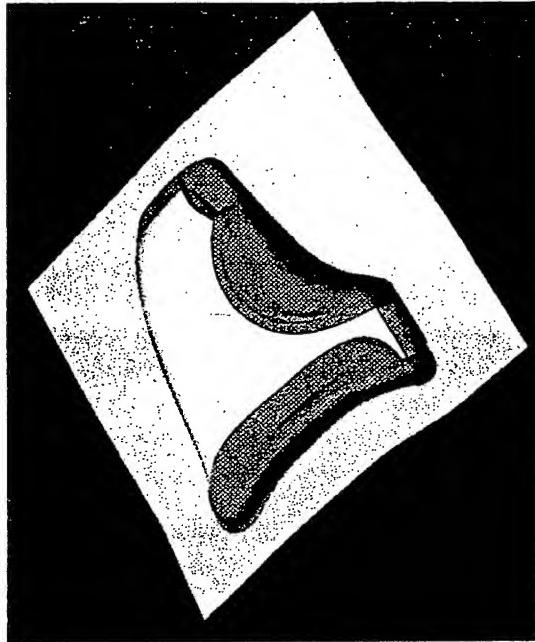
Figure 6A

Figure 6B



New tooth

Existing tooth for the  
existing part



*6/pets*

## SUBSTITUTE SPECIFICATION WITH MARKINGS

JC20 Rec'd PCT/PTO 11 OCT 2009

## PARAMETRIC REVERSE ENGINEERING METHOD FOR DESIGNING TOOLS

BACKGROUND OF THE INVENTION(1) Field of the Invention

[0001] The present invention relates to the field of pressing-simulation methods. The present invention relates more particularly to a parametric reverse engineering method for the design of tools.

(2) Prior Art

[0002] The conventional process for creating dies follows a cycle of iterations: design, evaluation and development from data for the part, with frequent coming and going between the steps.

[0003] The known methods of the prior art consist of implementing simulations from a CAD file. A report is produced at the end of the simulation steps but each new simulation is performed without taking account of the results of the previous ones: there is in the methods of the prior art no capitalisation according to the work already carried out.

[0004] The present invention sets out to remedy the drawbacks of the prior art by making it possible to capitalise on the experience acquired and reuse the work already carried out.

SUMMARY OF THE INVENTION

[0005] To this end, the invention concerns, in its most general acceptance, a parametric reverse engineering method for the design of tools, characterised in that it comprises the steps consisting of:

- importing an existing model (the design of an existing tool for the existing part);
- producing a template for the existing tool;
- separating the tool from the part;
- cataloguing (saving in a numerical database structured in the form of a catalogue) the creation of the existing tool using section lines and characteristic lines;
- removing the original part;
- parameterising the template of the existing tool (creation of a parametric profile on the section lines and characteristic lines);
- importing the new part;
- making the parametric template correspond to the new part;
- creating the new model, that is to say the new tool for the new part.

[0006] According to a first variant, the step consisting of making the parametric template correspond to the new part is carried out automatically.

[0007] According to a second variant, the step consisting of making the parametric template correspond to the new part is carried out interactively.

#### BRIEF DESCRIPTION OF THE DRAWINGS

[0008] The invention will be understood better with the help of the description given below, purely by way of explanation, of an embodiment of the invention, with reference to the accompanying figures:

[0009] [[•]] figure 1 illustrates the iterative process of creating dies;

[0010] [[•]] figure 2 presents the methodology of fabricating a die;

[0011] [[•]] figures 3A and 3B presents the input of the reverse engineering method according to the invention including the new part and the existing tool for the existing part;

[0012] [[•]] figures 4A, 4B, 5 and , 6A and 6B illustrates the reverse engineering method according to the invention. More specifically figure 4A illustrates the breakdown of the existing tool; figure 4B illustrates the die entry line; figure 5 illustrates the breakdown of the existing tool and reconstruction of the profile; figure 6A illustrates the new tool; and figure 6B illustrates the existing tool for the existing part.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

[0013] The method according to the invention makes it possible to conceive the design of the new die by working on the designs of an existing tool and a new part. The methodology of manufacturing a die is depicted in figure 2.

[0014] The data to be supplied as an input for implementing the method according to the invention are:

- the new part
- the existing tool for the existing part.

[0015] The existing tool is then broken down by automatically tracing in particular the die entry line and by reconstructing the profiles.

[0016] Another step consists of recomposing the new die using the various parametric entities (profiles, blank-holder surface, etc).

[0017] The invention is described above by way of example. Naturally a person skilled in the art is in a position to

implement various variants of the invention without for all  
that departing from the scope of the patent.